Morris ARBORETUM BULLETIN

SEPTEMBER 1952

Volume 5 Number 2

FIG. 4. LORENZO LORRAINE LANGSTROTH

Published by
The ASSOCIATES of
THE MORRIS ARBORETUM

The Morris Arboretum Bulletin is published quarterly at Philadelphia, Pa., by the Associates of the Morris Arboretum, Chestnut Hill, Philadelphia 18. Annual subscription, $1.00. Single copies, 30 cents. Free to Associates.

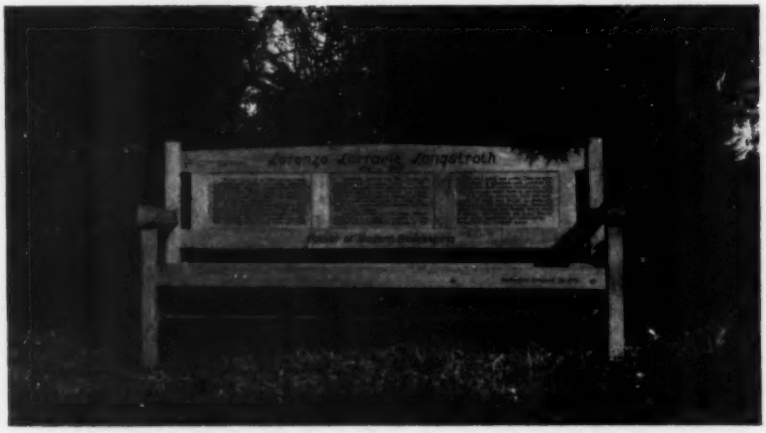

Fig. 5. Langstroth Memorial Bench, unveiled October 20, 1951

INSCRIPTION

In bee hives of a century ago, bees fastened comb to the hive walls. Removal was possible only by cutting, often after killing the bees. Management of colonies under this crude procedure was difficult, and apiculture languished.

In 1851 Langstroth discovered a new basic fact of bee behavior: They respect and leave open any hive spaces 5/16 inch wide, whereas they seal narrower ones with bee glue and utilize wider ones for comb.

Brilliantly applying this fact, Langstroth designed the moveable-frame hive, the frames separated from each other and from the hive walls by the inviolate "bee space." With its comb-containing frames now freely moveable without injury to bees or comb, the Langstroth hive ushered in a new era in bee culture.

Important to man as is the honey garnered by bees, it is vastly surpassed in value by their role as pollenizers of plants of the orchard, field, forest, and garden. Thus the great development of apiculture made possible by Langstroth's work confers incalculable benefits on a much wider front in our economy.

It is fitting, therefore, that this bee garden of trees and shrubs be gratefully dedicated to his memory in the community where he was born and reared; and in which a century ago he made the basic discoveries which revolutionized beekeeping throughout the civilized world.

THE LANGSTROTH BEE GARDEN

FOREWORD

High on the list of educational developments at the Morris Arboretum had long been a garden or collection of trees and shrubs significant in apiculture. And it seemed eminently appropriate that such a garden be named in honor of Lorenzo Lorraine Langstroth (1810-1895), a Philadelphian who through his studies probably contributed more than anyone before or since to the development of successful bee culture in America.

Since 1951 marked the centenary of his greatest discovery, it was decided to initiate the garden and to dedicate it within that year, even though the collection obviously would be in its infancy. And when it is recalled that Langstroth attended the University of Pennsylvania Preparatory School and years later did his epoch-making work in his apiary in West Philadelphia on ground now University campus, there is added appropriateness in honoring his memory in Philadelphia and under University auspices.

Taking advantage of an already existing group of trees and shrubs germane in large part to a bee garden, the Langstroth Memorial was established on an area upwards of an acre in that portion of the Morris Arboretum situated in Montgomery County and known as "Bloomfield." Plantings in the spring of 1951 brought the total number of native and exotic species and varieties of woody bee plants in the garden to about seventy. Additions will be made as plants and authentic information become available.

From time immemorial man has treasured and nurtured honey bees for the honey they produce. And honey, delectable product that it is, will always retain its compelling appeal, even though as the chief source of sugar for man it has long been overshadowed by such prolific sugar crops as sugar beets and sugar cane. But in recent times, especially under the rapid change in agricultural practices during the past half century, honey bees have attained a vast importance in our economy in quite another direction, namely, as pollinators of important crop plants. Indeed, so great now is their role in this connection that, viewing the beekeeping industry as a whole, honey production is becoming of secondary importance.

This subject is treated at length by Dr. James I. Hambleton in his paper delivered at the dedication and printed in pages that follow. Brief reference is made to it here, however, to call attention to the vital interrelations between bees and plants and therefore the appropriateness of a "Bee Garden" in an Arboretum with research and educational objectives. As time goes on these basic interrelations are to be increasingly illustrated by appropriate plants accompanied by suitable explanatory material to make these interrelations intelligible to the public. It is hoped, too, that the garden may stimulate research in the vast and important field of the interdependence of plants and their pollinators —a subject largely unexplored and in which the honey bee is steadily assuming greater and greater significance.

Though it will require considerable time to develop the full potentialities of the garden, the Morris Arboretum is happy that the undertaking is launched, and that this was consummated in the centennial year of Langstroth's greatest discoveries. The Arboretum is further appreciative that it has been privileged to sponsor what is apparently the first tangible recognition in Philadelphia of one who was himself a Philadelphian and whose great work on honey bees laid the scientific and practical foundation of modern bee culture.

This brief foreword cannot close without expressing appreciation to the many whose generous help contributed so largely to the initiation and successful launching of the Langstroth Bee Garden. Our thanks go first of all to the speakers at the dedication exercises. Of the others, above all members of the bee fraternity, space precludes mentioning them all. But special acknowledgment must be made to the members of an informal group for their effective contribution, especially during the formative period of the enterprise, namely: Professor W. W. Clark, Extension Apiarist, Pennsylvania State College; Mr. Charles K. Hallowell, Philadelphia County Agricultural Agent; Mr. Harry Pye and Mr. Edward R. Glenn, prominent members of local beekeepers' associations; Mr. Paul Cummins, President of the Montgomery County Beekeepers' Association; and Mr. Elmer Reustle, Past President of the Pennsylvania State Beekeepers' Association. The last also generously underwrote in large part the fabrication of the Langstroth Memorial Bench.

To the final member of this group, Mr. Fred W. Schwoebel, well known Philadelphia beekeeper and student of hive life, particular acknowledgment is due. It is to him that the

Arboretum is indebted for the suggestion that the Bee Garden might appropriately be constituted a memorial to Lorenzo Lorraine Langstroth, at the same time calling attention to 1951 as the centennial year of Langstroth's most memorable discoveries. It is indeed fortunate for the Arboretum that Mr. Schwoebel, who for some years has maintained stands of bees in the Arboretum, has consented to act as Curator of the newly established garden. His deep interest in bees, in Langstroth, and in the garden augur well for the future of the enterprise.

Special thanks are due, too, to the liberal contributors to the impressive exhibit staged in the Morris Mansion on the dedication day: Mr. Paul Holcombe, State Bee Inspector of New Jersey; Mr. William Reed, of Philadelphia; Professor George J. Abrams, Professor of Apiculture, University of Maryland; Professor Edwin G. Anderson, Professor of Apiculture, Pennsylvania State College; Mr. Paul Cummins; The Pennsylvania Horticultural Society, and Mrs. Marion Code, Librarian of the Society; The Academy of Natural Sciences, and Dr. Venia T. Phillips, Librarian of the Academy. To Mr. J. Worthen Vrooman the Arboretum is also indebted for providing the excellent address system used at the outdoor dedication.

Unique in the exhibit were the Langstrothiana kindly brought by Mr. William Langstroth Cowan, grandson of our hero, from his home in Toronto, Canada. Among these were such precious documents as the original United States patent papers granted to L. L. Langstroth on his moveable frame hive, those referred to in Mr. Cowan's Reminiscences, and many others.

Finally it must be recorded that, largely through the lively interest of Mr. W. L. Cowan, and also of Mrs. Cowan, the Arboretum and the dedication occasion were signally honored by the presence of five direct descendants of L. L. Langstroth: Mr. William Langstroth Cowan, grandson, from Toronto, Canada; Mr. A. H. Cowan, grandson, from Erie, Pennsylvania; Miss Anna L. Cowan, granddaughter, from Dayton, Ohio; Mrs. Peggy Cowan Kohler, great-granddaughter; and Mr. George Cowan, great-grandson, from Pittsburgh, Pennsylvania.

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PAPERS READ AT THE DEDICATION

LANGSTROTH AND THE ACADEMY OF NATURAL SCIENCES

M. Albert Linton

President, Academy of Natural Sciences of Philadelphia

When one knows absolutely nothing about a subject, an effective way to remedy the situation is to agree to make a speech about it. That was exactly my condition a few months ago when I was asked to represent the Academy of Natural Sciences on this occasion. I could not recall ever having heard of the Rev. Lorenzo Lorraine Langstroth before Mr. Schwoebel's article in a recent issue of *Frontiers;* and what I knew about the development of honey bee culture was practically nil. However, I am glad to say that I have advanced a wee bit beyond that abysmal stage. Moreover, the process of so doing has been a pleasant one. Mr. Langstroth has proved to be a most interesting character, and his book on the honey bee a fascinating one.

I am reminded of the botany professor who was prevailed upon by a colleague, a professor of anatomy, to take the anatomy class for a few weeks while the anatomy professor went on a scientific expedition. Shortly afterward a friend asked the substitute professor how he was coming along as a teacher of anatomy. "Oh" he replied "by burning the midnight oil and studying furiously, I am able to keep about one bone ahead of the class." Maybe the information I have recently acquired about Langstroth and his bees puts me in that position relative to some of you here gathered today.

My subject is Langstroth and the Academy of Natural Sciences of Philadelphia. Langstroth, born in Philadelphia on Christmas day, 1810, left the city of his birth at the age of seventeen to enroll at Yale University; and after his graduation with Phi Beta Kappa distinction, he entered the Yale Divinity School. Going from there to a pastorate in Andover, Massachusetts, and later removing to Greenfield, Massachusetts,

FIG. 6. Part of audience at dedication exercises listening to the reminiscences (see later pages) of Mr. Wm. Langstroth Cowan on his grandfather Lorenzo Lorraine Langstroth.

he did not again take up his residence in Philadelphia until 1848. In 1852 he left Philadelphia, never again to reside in the city of his nativity.

It is during this period of four or five years that his contacts with the Academy developed. And these were precisely the years of his most intense and productive work on honey bees and hive life, work which has benefited so profoundly and on a world wide scale a branch of husbandry the full importance of which is still not fully appreciated.

Before pursuing further Langstroth's relations and contacts with the Academy I should like to recall something that happened in his sophomore year at Yale which throws light on his independence of mind and character.

Food in the common dining room became so inferior that the students staged a "Bread and Butter Rebellion." Crowds gathered about the dining hall but no one entered—a stand-up noncooperative strike. Despite promises by the faculty to remedy conditions, the students refused to enter the dining hall until the promises had been made good. Langstroth, recalling his promise to his parents to obey college laws, announced his intention of entering the hall whatever his comrades might do. A committee was appointed to remonstrate with him—all to no avail. At the time of the third boycotted meal he boldly entered the hall alone accompanied by yells of execration and some throwing of stones. The faculty, fearing for his safety, voted to excuse him from entering the hall again. Not to be brow-beaten by his fellow students, he entered for the next meal, this time accompanied by several others, most of whom were professors of religion. His courageous course of action, at first so unpopular, in the end made him a host of friends.

When Langstroth lived in Philadelphia the Academy was located at the northwest corner of Broad and Sansom Streets, just two and one-half blocks from Langstroth's home at what is now Chestnut and Sixteenth Streets. The record shows that he was elected to membership on September 30, 1851, one hundred years and twenty days ago. Between the time of his election and final departure from Philadelphia the next year, the minutes record him as present at nine meetings of the Academy.

A search has revealed only two occasions on which he published in the Proceedings of the Academy. The more important of these, and of the greatest interest on this occasion, was his paper entitled "The Impregnation of the Eggs of the Queen Bee," appearing in the 1852 volume (Volume 6). In this study he had the help of Dr. Joseph Leidy, who in turn had the assistance of Dr. Charles M. Wetherill, another Academy member and a chemist. Leidy was then a

young man who later became the distinguished President of the Academy from 1882 to 1891 and one of the foremost of American biologists. Many of you are doubtless familiar with the fine bronze statue of Dr. Leidy which formerly was on City Hall Square but now happily and appropriately located in front of the Academy on Race Street near Nineteenth.

Leidy carried out the microscopic observations involved in Langstroth's study of the queen bee, help of which Langstroth was profoundly appreciative. Thus he states in his famous book, "On the Hive and the Honey Bee"—"No man in this country or Europe was more competent to make the investigations I desired." This paper on the queen bee, read before the Academy February 4, 1852, for the first time—without a question of doubt — established the true function of the queen bee and the drones in the hive. It is therefore an important contribution and one peculiarly intimately associated with the Academy. The manuscript of this paper in Langstroth's own hand, normally in the Library of the Academy, is on display in the exhibit arranged by the Morris Arboretum for this occasion in the Morris Mansion across the way.

The only other publication in the Proceedings of the Academy is a note entitled "On the Honey Ants," which also appeared in the Volume for 1852. Langstroth presented it before the Academy on May 11, 1852, Dr. Leidy adding some remarks on the subject. The study was undertaken as a result of receiving from Langstroth's brother a shipment of honey ants from Mexico.

Academy records also reveal that on one occasion Langstroth presented to the Academy some royal cells of the honey bee and made some observations on them which are recorded in the Proceedings.

We shall doubtless hear in what is to follow on this program about our hero's fundamental discovery of the "bee space" in 1851, just at the time of his active membership in the Academy. That he did not also publish in its Proceedings this epoch-making work on the "bee corridor" and its brilliant application to hive design, is doubtless due to the fact that he incorporated them in his famous book "The Hive and the Honey Bee," the first edition of which, a volume of 384 pages, appeared in 1853. Langstroth presented a copy to the Academy, which likewise is on display in the current exhibit already alluded to. Although not autographed, it is annotated on the flyleaf in his own hand "Presented by the Author on the usual conditions, 22d July, 1853." This book went through three editions, many printings, and was translated into five European languages, achieving world-wide acclaim.

We shall doubtless hear more about this classic from those who will follow me in this program. But here I should like to remark that even one altogether unfamiliar with bee culture can get a thrill from this book. Its style is friendly, easy to read, adorned with appropriate classical references, and above all fascinating in the story it has to tell. Langstroth was a master in narrative and exposition. A vast amount of valuable information and advice about hives and beekeeping is included in the book. No wonder that it had such a world-wide decisive influence upon honey bee culture. If any of you here today are not familiar with it, I assure you it will repay your browsing through it.

As already indicated, the active connection of Langstroth was limited to some four or five years. Had he remained in Philadelphia this relation, keen and penetrating naturalist that he was, would surely have been long continued. But brief though it was it was fertile and productive.

Though the membership of the Academy at the time was only some 170, it was a very active period in the Academy's long history in which a goodly company of men of distinction took part. We need recall only a few of the noted figures active in the intellectual and scientific life of the Academy at the time: The loveable and illustrious Dr. Leidy already mentioned, distinguished zoologist, paleontologist and anatomist; Thomas Nuttall, the famous botanist and student of American flora and avifauna; Samuel George Morton, the anthropologist and later President of the Academy; Walter Johnson, outstanding mineralogist; Charles Pickering, botanist on the Wilkes Expedition; Isac Lea, noted conchologist; S. S. Haldeman, entomologist; John Cassin, Corresponding Secretary of the Academy at the time of Langstroth's election and a noted ornithologist. In the company of such kindred illustrious spirits, we may be sure that Mr. Langstroth was happy and at home.

THE NEW ROLE OF HONEY BEES IN AMERICAN AGRICULTURE

JAS. I. HAMBLETON

In Charge of Bee Culture, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture

It is a great pleasure, as well as an honor, for me to be invited to take part in this memorable occasion—the dedication of the Langstroth Bee Garden. The mere fact that a great institution, such as the University of Pennsylvania, is thus recognizing the achievements of Reverend Langstroth, a humble beekeeper, is significant in itself. This occasion reminds me of a somewhat parallel case a number of years ago, when the Ohio State University granted an Honorary Doctor's Degree to Mr. E. R. Root of Medina, Ohio. Throughout the years of its existence, Ohio State University has granted hardly more than fifty honorary degrees. One would judge from this that candidates to receive this honor are selected with great care. My regard for the University, which was already high, rose further when I considered that in honoring Mr. Root, a figure well known in the beekeeping world, it also recognized the importance of honey bees in everyday life—a fact which Mr. Root did much to promote.

When I was asked to appear on this program, I accepted with some reluctance. I was well aware that there would be speakers present who were much better qualified than I to speak about the life and work of the man whose memory is being honored today. I, therefore, decided that I had better confine my remarks largely to the bees themselves. In the preface of his book "The Hive and the Honey-Bee," Langstroth quotes a poem from Bowring to express his own regard for the bee:

"What well-appointed commonwealths! where each
Adds to the stock of happiness for all;
Wisdom's own forums! whose professors teach
Eloquent lessons in their vaulted hall!
Galleries of art! and schools of industry!
Stores of rich fragrance! Orchestra of song!
What marvelous seats of hidden alchemy!
How oft, when wandering far and erring long,
Man might learn truth and virtue from the BEE!

It is true, of course, that honey bees are the same today as when Langstroth was in his prime. But I believe it is correct to state that the honey bee occupies a somewhat different role in American agriculture, and thus in the lives of all of us, than it did during Langstroth's time. Reverend Langstroth, as a beekeeper, was interested in exploiting these insects in such a way as to return the maximum of pleasure and profit to those who kept them. His invention of the movable-frame hive, in 1851, marked the beginning of an era when man for the first time could really take advantage of the behavior and industry of these insects to benefit himself. Commercial beekeeping came into existence, and the hive we use today is in principle the same as that invented by Langstroth.

On reading the works of Langstroth one finds few references to the part that bees play in pollination. It is to this phase of the honey bee, however, that I should like to extend my remarks.

For many years biologists have been aware that certain insects, particularly those that feed on nectar and pollen in both the mature and immature stages, are essential agents in transferring pollen from blossom to blossom on the same plant or from the blossom of one plant to that of another of the same species. Without these agents, usually bees of one kind or another, pollination does not take place and the plant remains barren of fruit or seed.

For the sake of illustration, we might roughly divide the flowering plants into two groups: (1) those that bear blossoms with light dry pollen, permitting pollination through the instrumentality of wind and gravity; (2) those that bear heavy sticky pollen which is not blown by the wind. The first group contains many important and well known plants, such as cereals (wheat, corn, oats, rye, barley), most other grasses, many forest trees, a few cultivated fruits, and many wild or non-cultivated plants. In the second group, which requires insects (occasionally other animals) to transfer pollen from anthers to stigmas or to expose reproductive parts before pollination can take place, will be found many of our cultivated crops.

Almost all varieties of apples must be pollinated with pollen from a different variety of apple. If a hive of bees is placed under the netting covering an apple tree in full bloom, no matter how well the bees work the blossoms, little or no fruit is formed because the apple requires cross-pollination with another variety. All varieties of sweet cherries require cross-pollination with another variety. Plums, pears and some varieties of peaches also fall into this category. It is characteristic of the cucurbit family, to which belong the pumpkin, squash, watermelon, cantaloupe, and cucumber, that the male and female elements are borne in seperate flowers on the same vine. Here, again, is an example

FIG. 7. Young Sourwood or Sorrel-Tree *(Oxydendrum arboreum)* in the Langstroth Bee Garden. An important bee plant of southeastern United States yielding a superb honey.

of a plant bearing a heavy, sticky pollen which the wind cannot transfer from the male to the female flower. Insects must do the work. Occasional cantaloupe flowers are hermaphroditic (stamens and pistil in the same flower). In such flowers, pollen transferred to the stigma of the same flower usually will not result in fertilization; cross-pollination is required. Almonds require insect pollination and many of the legumes are entirely dependent on bees for seed production. In the case of the alfalfa flower, unless tripped by an insect the reproductive organs are never exposed to view and therefore remain inaccessible for pollination. As a result the flower eventually withers and falls from the plant without forming seed. An insect must first trip the blossom to expose the stamens and stigma; and, that not being enough, must transfer pollen from another flower (cross-pollination) if seed is to result. The red clover blossom also requires tripping and the transfer of pollen from another blossom before the ovary can develop its quota of seeds. The production of cabbage seed depends on bees; similarly radish, kale, cauliflower and most of the other members of the cabbage family. Bees are necessary for the production of onion and carrot seed as well.

I have made no attempt to give a full list of plants that are completely dependent on bees for fruit and seed production, or plants that produce better when pollinating insects are plentiful. However, some fifty of our cultivated crops fall into this class. In addition, there are many wild plants, forest trees, etc., that are benefited by insect pollination. This is sufficient, however, to emphasize that many of our most delectable food sources would be denied us if it were not for pollinating insects.

At this point I should like to refer for a moment to an earlier time in the history of this country. When the Pilgrims landed in this virgin country there was certainly no pollination problem as such. For centuries there must have been maintained a balance between plants that required insect pollination and the numbers and availability of the insects that were capable of effecting pollination. The reproduction and natural succession of plants was little disturbed by man. However, when our forefathers began to hew down the forests in order to cultivate the ground for the growing of food for their tables, there was started a nature-upsetting process that has continued to the present day. When a large tract of land is planted to a given crop, several things happen. For one thing, the ground is disturbed and, as most pollen- and nectar-consuming insects—mainly bumble bees and solitary bees of one kind or another—nest in or close to the ground, their nesting sites are destroyed. A wide variety of plants no doubt flourished on the land in its native state, plants that provided continuous bloom from early in the spring until frost. But when that land is planted to alfalfa, let us say, the succession of blooming flowers is destroyed. It is only during the few weeks alfalfa is in blossom that it provides a livelihood for bees. At this time there are such a vast number of blossoms that the insects present are too few to go around, if a seed crop is to result.

The United States is, or was, blessed with many species of pollinating insects. Bumble bees are well known to everyone. Of all the native pollinators, the bumble bee is the only social insect. Honey bees, of course, are social insects of the highest order but are not native to America. The others, such as *Megachile* and *Nomia,* are solitary. The female makes a nest in a burrow in the soil, or in the hollow stem of a plant, provides it with pollen, lays her eggs, and the young emerge without further care by the adult insect. Plowing and cultivation of the soil destroy these insects. Major changes, such as drainage of swamp lands, irrigation of arid lands, cutting out woodlands, clean cultivation, elimination of weeds, all combine to destroy the beneficial insects. The native or wild pollinating insects have gone, or are going, the same way as the Indian. The insects, however, are more unintentional victims of the white man than were the Indians.

Of recent years, a still greater threat has affected the welfare of the beneficial insects,

namely, the employment of chemicals to destroy the insect pests that attack our cultivated crops. Up to the time of World War I, insecticides were almost unknown. The discovery that the arsenicals were effective in controlling the codling moth, potato beetle and other insects attacking our crops in wholesale numbers, resulted in the usage of vast quantities of these materials. For many years following World War I, the arsenicals in one form or another largely were depended upon to safeguard our crops from insect ravages. During World War II, however, DDT was discovered and it was found almost at once that this chemical was highly effective in freeing our troops of body lice, fleas and other vermin. Entomologists soon found that the same chemical could be used effectively in controlling a large variety of insects and that house flies, in particular, succumbed magically to this insecticide. Whole communities were freed almost overnight from this pest. Mosquitoes were also miraculously eliminated when DDT was dusted over their breeding places. Following the discovery of DDT, other new insecticides came into being—benzene hexachloride, chlordane, parathion, and many others.

These new organic chemicals can be looked upon as the miracle insecticides of this era. Small quantities were highly efficacious, so much so that formulas and methods of application have been developed to the point where, for the first time, it has become economical to treat crops that have never been protected by insecticides. Application by airplane has made it feasible to treat fields of standing corn, alfalfa fields, swamp areas and forest lands. As a result, today we find few crops that are not treated at one time or another with insecticides. Man's clothing is destroyed by insects and the very timbers of his house are attacked. His food, in all forms, from the growing stage to the packaged form, is subject to insect attack. His health is affected by mosquitoes, fleas and other insects that either annoy him and his livestock or that act as carriers of such diseases as malaria, yellow fever, bubonic plague, and typhus.

Most insecticides used today are non-specific in respect to their toxicity to any one species of insect. DDT and other organic insecticides are effective against many kinds of insects. When these toxic materials are applied over the length and breadth of the country, not only do the injurious insects fall prey to their usage but many of the beneficial ones as well. In man's effort to keep the upper hand he is taking two steps forward and one step backward. If beneficial insects were limited to bees, the flower visitors, losses could be minimized by not spraying during the blossom period. However, parasitic and predacious insects are beneficial in that, when given a chance, they will destroy harmful insects. We are thus systematically destroying the very insects that can help us keep the injurious insects under control. Pollinating insects have been destroyed in such numbers that the effect is readily seen in lowered seed and fruit production—today during a period we like to consider the most progressive era in American agriculture.

In addition to the unwitting destruction of the beneficial insects, another element is creeping into the picture which demands the immediate consideration of all officials having to do with the welfare of mankind. After several years usage, it was discovered that house flies were developing resistance to DDT. Resistant strains of this insect have developed in a remarkably short time, to the point where DDT can no longer be used to control them effectively. Also, it was discovered that once an insect developed strains resistant to DDT, it quickly developed races resistant to some of the other organic insecticides as well. Today we are faced with the fact that already we cannot depend upon DDT to control house flies. Body lice on our troops in Korea cannot now be controlled with DDT. Mosquitoes have developed strains resistant to this insecticide and cockroaches are falling into the same category. Certain species of mites have developed races resistant even to parathion, one of the most toxic of all insecticides. The question is, therefore, what are we going to do? Are we going to be compelled to develop still more toxic insecticides to keep the upper hand on injurious insects? Are we rapidly approaching the time when we shall not be able to live without a daily dusting with some insecticide?

The Japanese beetle is not a pest of agriculture in its homeland, Japan. Consider the tremendous damage that this imported pest has done in this country. Our attack on this insect has been largely through means of chemical control; nevertheless, it has steadily spread throughout the Northeastern States. Has not the time come when we must try to restore the balance between the injurious and the beneficial insect? Should we not at least attempt to pit one against the other in order to free ourselves of complete slavery to insecticides? Once biological control is established, there is little more to be done. It is the most economical method of control in the long run and by far the safest. There is no poison-residue problem. Most of the insecticides used today are not only destructive to insects, but can be harmful to man and livestock as well.

I mention all this because honey bees are also subject to destruction by insecticides. In certain sections of the country beekeepers have had to abandon keeping bees because of poisoning hazards. We know so little about the biology

and habits of the native pollinating insects that nothing today is being done to conserve them, let alone to propagate their numbers. The result is that we must rely on the honey bee, which man can protect to a certain degree against insecticides, if we are to continue raising legumes for soil improvement and feed for livestock, and to continue to enjoy fruits and many other delectable foods.

In 1925 Utah produced a top crop of 26 million pounds of alfalfa seed. From that high point, the production per acre, as well as total production, has steadily declined until today it hovers around 3 million pounds. Every effort has been made to stop this downward trend. In trying to learn why this decline has occurred, little thought has been given to the part that bees play in seed production. The average production of red clover seed per acre in the United States is about 9/10 of a bushel. Yet red clover thrives and blossoms as well as it ever did. An ordinary good stand of red clover today produces enough blossoms, weather conditions being satisfactory, to produce 8 or more bushels of seed per acre. Pollinating insects, however, must be present in sufficient numbers to effect the enormous job of cross-pollination. An care of alfalfa or red clover may contain upwards of 500 million florets per acre. Why should we expect nature to provide the pollinating insects? In other words, we have already reached the point where pollination as a crop requirement must be planned and provided for in the same way as other recognized crop practices, such as soil fertility, drainage, moisture, good seed, etc.

In 1946 the U. S. Department of Agriculture established the first experimental plots to determine just what role bees played in alfalfa seed production. After a few years of patient work and close observation, it became apparent to those working on the project that at least two things were necessary to turn the trend in seed production, namely, that injurious insects must be controlled and that pollinating insects must be provided to produce a profitable crop. In one experiment conducted in California, a field of 132 acres of run-down alfalfa was used to demonstrate what honey bees could do. Hives of bees were placed on the perimeter of the field; also, rows of hives were scattered throughout the field, even though some alfalfa had to be trampled down in order to place the hives. Slightly over 5 colonies per acre were used on this plot. The result was a harvest of 1120 pounds of thresher-run seed per acre. The State average was 275 pounds of clean seed.

When colonies of honey bees are placed in such concentrated numbers, there are not enough flowers for the bees to produce a crop of honey. The use of bees in this manner is, therefore, non-productive to the honey producer. If his bees are used for pollination, he must be paid for this service in the form of cash or in a certain percentage of the seed harvested. As a result of this work, California has caught on rapidly to the idea that bees must be brought into alfalfa fields if profitable crops of seed are to be produced. The upward turn is very much in evidence. Recently an agronomy authority in the State prophesied that, with the excellent soil and weather conditions prevalent and with a continued and planned use of bees, California alone could provide the nation with all the alfalfa seed required. As a result of the experimental work, records of all kinds are being made in high seed production from alfalfa, ladino clover, sweet clover, and red clover, where bees are used as a cultural practice in the production of the crop.

FIG. 8. A glimpse in the Bee Garden, with the Langstroth Memorial Bench. The very durable wood of the "Shipmast" variety of Black Locust *(Robinia pseudoacacia* var. *rectissima)* was used throughout in constructing the bench. Black Locust yields an excellent honey.

More recently, experiments were conducted in Arizona which proved the value of honey bees in fields of cantaloupe. Where honey bees were excluded from the melon vines, practically no fruits were produced. Where bees were provided in plentiful numbers, 61 more crates of melons per acre were produced than were obtained elsewhere in the field where nature alone provided the pollinating insects. It was found further that when pollinating insects were plentiful, more crown fruits (those closest to the root and the best fruits) were developed in contrast to the poorest fruits produced farther out on the vine; and that these fruits were larger, contained more sugar and more seed. This past year, as a result of this one experiment, there were very few cantaloupe fields in Arizona that did not have a line of bee hives to provide pollination.

Little or no attention has been given to the part that bees might possibly play in the pro-

duction of cotton. The cotton plant is abundantly provided with nectaries. Some of these are on the leaves, and some are at the base of the flowers. A few investigators have ventured to say that bees might possibly play an important part in the production of cotton seed and lint. But, as in many other plants, the role of pollinating insects has not been determined. The cotton blossom is largely self fertile, yet in some species the stigmatic surface is not always well covered with pollen. It is quite possible that these beneficial insects can be utilized to benefit this crop, which on the surface would seem to be aloof from service by pollinating insects.

I have brought you on a long and seemingly roundabout journey. All of us are gathered here to commemorate the memory of a man who made possible modern beekeeping. We shall appreciate more and more our indebtedness to him as the world slowly recognizes the role which honey bees play in the life of every one of us. The dedication of this Memorial Garden will remain as a living and growing monument to the work of this great man, who devoted so much of his life and effort to promote the study of the honey bee, the insect which provides our only source of honey and beeswax, and is increasingly responsible for the burden of pollinating a vast array of our most delicious and essential foods. I wish to commend the Morris Arboretum of the University of Pennsylvania and the beekeepers and others whose wisdom and foresight made possible the creation of this Memorial Garden.

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REMARKS INTRODUCING MR. E. F. PHILLIPS, JR.

EDWIN J. ANDERSON

Professor of Apiculture, Pennsylvania State College

All of us were profoundly sorrowed as we learned of the death of Dr. E. F. Phillips, Professor Emeritus of Apiculture at Cornell University. It is a grievous loss to our industry.

Those of us who knew Dr. Phillips well experienced a great deal of satisfaction as we observed how one outstanding leader recognized the work of another, as Dr. Phillips recognized the value of the discovery made by Rev. L. L. Langstroth. It was due to Dr. Phillips' keen appreciation of values that the beekeeping industry of today became aware of the significance of the discovery made by Rev. Langstroth. As we review the work of these two men, it is noteworthy that both should have spent unusually fruitful periods of their lives in exactly the same area—that occupied by the University of Pennsylvania.

Dr. Phillips learned about honeybees for the first time when he was a graduate student at the University. The problem suggested to him at that time by his faculty advisor introduced him to the field of beekeeping, and started him on his life's work as we know it today. The subject given him for his doctor's thesis was "A Study of the Compound Eye of the Honeybee." While working with this problem, the then young E. F. Phillips became interested in this valuable insect and saw the need for an extensive research program in beekeeping. Upon leaving the University, he was selected as the one qualified to head the beekeeping work in the United States Department of Agriculture. It is, therefore, the selection of this thesis subject on bees and the training at the University of Pennsylvania to which we indirectly owe much as an industry.

In the later years of his active life, Dr. Phillips spent many long hours tracing the activities of Rev. Langstroth from youth through his last days. Neither time nor expense was spared as he traveled from the region where Rev. Langstroth spent his youth, through each step of his life's activity, in the hope of finding a few more facts from the old residents or the records of each community where Rev. Langstroth had spent some time. I believe that few things in his life gave Dr. Phillips greater satisfaction than the discovery of each new fact about Rev. Langstroth.

It is the accumulation of the results of all this effort that has finally made it possible to tell the story soon to be presented by the son of Dr. E. F. Phillips, Mr. E. F. Phillips, Jr. Unfortunately for our industry, the speaker did not choose to follow in his father's footsteps. We are none the less appreciative, however, of his interest in his father's work and his willingness to present the manuscript which his late father had completed for this occasion before his untimely death on August 21.

LANGSTROTH—PHILADELPHIA BEE KEEPER

E. F. Phillips

Late Professor Emeritus of Apiculture, Cornell University

It is eminently appropriate that the celebration of a discovery made by Lorenzo Lorraine Langstroth should take place in the Philadelphia area, on a date close to that of the actual discovery. Langstroth was a Philadelphian and his name should be perpetuated here more than in any other place.

He was born in 1810 as a Christmas gift to a loving family as well as to an important part of humanity in need of his benefaction. His birthplace was 106 South Front Street, which he described as "not far from Independence Hall."

His grandfather, Thomas Langstroth, had come from West Riding, in the parish of Horton, Ribblesdale, England. Near here the River Wharfe rises in a mountain valley which still bears the name of Langstrothdale. At twenty-two, in 1767, Thomas Langstroth came to America on business, decided to remain in this country, and never returned to his homeland. Here he married Ann Youck, whose parents had come from Prussia and settled in Germantown. They had twelve children, of whom eight lived.

The fourth son, John George Langstroth, Lorenzo's father, married Rebecca Amelia Dunn, the daughter of an English family which had settled on the Eastern Shore of Maryland. Her mother traced her ancestry to the Lorraines, Hugenots of nobility, who had fled from France after the revocation of the Edict of Nantes. Thus our Lorenzo Lorraine Langstroth traced his origins to England, Germany, and France.

He was the second of eight children and the oldest son. As a child he developed an unusual interest in the habits of insects, and he recorded in his reminiscences that he was "whipped" as a young boy for wearing out the knees of his trousers "by too much kneeling on the gravel walks" in his eagerness to "learn all he could about ant life." Langstroth also tells of his observations of the habits of the cicada, which he began watching in Center Square (now City Hall Square) at the tender age of eight, and continued to observe each season of their emergence until he was twelve. Forty years later when he returned to Philadelphia, it was again a locust year, and he collected large numbers of pupae (which he called larvae) from trees in Independence Square. These he showed to his daughter, and she and some of her companions sat up until after midnight with him watching the curious changes as the pupae became adult cicadas. The childhood interest of Lorenzo in insect life is significant as a kind of prophecy of his later keen observations of bee-life.

The neighborhood in which young Langstroth grew up was at that time a choice residential section, but it is now changed beyond recognition. Today it teems with commercial activity.

Langstroth attended the preparatory school conducted by the University of Pennsylvania and studied the usual required subjects of that day, which would probably be regarded as of little practical value by the parents of today's children. The demands for college entrance, then as now, were severe; but in those days they included, besides Latin and a modern foreign language, Greek and a heavy schedule of mathematics. None of the interesting new fields of study which today are required were included, nor even recognized.

At seventeen, Langstroth entered Yale College, where his curriculum may be described as "more of same." Again he studied the classical languages, including Hebrew, more modern languages, advanced mathematics, logic, some history, and abundant rhetoric. The only course in the curriculum which even faintly suggests the biological sciences was one in "Paley's Natural Theology, or Evidence of the Existence and Attributes of Deity." The modern biologist would scarcely consider this an adequate training for work on the behaviour of an insect. Nevertheless, this was Langstroth's preparation for his scientific contribution to beekeeping. In favor of the stiff curriculum, it may be said that anyone who could survive all those courses at least learned to use his mind.

During Langstroth's senior year at Yale, the course of his future life was determined by the arrival of a new student, Peter Parker, who became his good friend. Parker had transferred from Amherst to Yale for the senior year, and it soon became apparent that he was deeply religious and desired to convert his classmates. Langstroth had not up until this time been concerned with religion; but after long discussions with Parker, he was the first man in his class to be stirred by the latter's preaching. Before the year was out, a number of the class had followed Langstroth's example and given up worldly things. The movement was sufficiently profound to be known later in Yale circles as "The Revival of 1831."

Nowhere in his writings does Langstroth indicate whether he had a plan for his future before his interest in religion became so intense; but now he decided to give his life to the Christian ministry. Therefore, after his graduation in 1831 he entered Yale's Theological Seminary, even though he knew that his father would not be able to help him financially because of recent business reverses. In his reminiscences he says, "I felt strongly persuaded that if, with a college course, I had not sufficient energy to finish my theological studies from my own earnings, I gave but poor evidence of having any call to preach the gospel."

To support himself, Langstroth now took up teaching, giving courses in schools for young ladies in New Haven; and for at least one year he held a full-time teaching position in a village across the Hudson from West Point. In his fourth year after graduation, Langstroth was made a tutor in mathematics at Yale, and at the same time came an opportunity to engage in the work to which he had dedicated his life.

During Christmas vacation, he supplied the vacant pulpit of South Church, Andover, Massachusetts. He made such a favorable impression on the congregation of South Church that he was asked to become its pastor on January 7, 1836. The three-year period of his pastorate at Andover in many ways was a happy interlude, although it was attended with certain difficulties. He had become increasingly subject to severe headaches accompanied by indications of melancholia. Also his mother and sister became dependent upon him, just at the time of his marriage to Anna Tucker, a daughter of the head of one of the schools in which he had taught in New Haven.

Langstroth came to know Anna Tucker through their mutual interest in mathematics while she was an assistant in her mother's school. Their marriage was an extremely happy one. Unquestionably, he owed much to her devotion, which never flagged during his periods of ill-health and through many periods of financial difficulties. To quote again from his reminiscenses, he says, "When I began housekeeping in the spring of 1837, the inflation of prices in the time of President Van Buren had culminated. I paid $15 for my first barrel of flour; and although my salary was considered a good one, it soon became quite apparent that my expenses would exceed my income. My dear wife, instead of even intimating that it was hard for us to begin the world with expenses much greater than would suffice for a considerable family, always encouraged me in doing my duty for the relief of the dear ones whom God had made dependent upon us, saying that we might thus safely trust events to our Heavenly Father."

It soon became evident that Langstroth's health would not permit him to continue his pastorate, and at the end of three years he was forced to resign. In the spring of 1840 he accepted an invitation to become principal of the Greenfield, Massachusetts, High School for Young Ladies, and moved his family to that city. While acting as principal, he supplied the pulpit of the Second Congregational Church for nearly two years, and then became its pastor.

In 1838, during his residence in Andover, a seemingly trifling event started the chain of happenings that led to Langstroth's interest from that time on in studying the life of the bee and perfecting the art and science of beekeeping. Calling on one of his parishioners, Langstroth noticed on the table a large glass globe filled with beautiful comb honey. His comments on this resulted in a visit to the parishioner's attic apiary. "In a moment," Langstroth remembered, "the enthusiasm of my boyish days seemed, like a pent-up fire, to burst out in full flame. Before I went home I bought two stocks of bees in common box hives, and thus my apiarian career began." Langstroth does not tell us the name of that beekeeper, which is a pity, for his name should certainly be gratefully remembered since he was responsible for arousing Langstroth's latent scientific interest.

Almost the first thing Langstroth did after moving to Greenfield was to buy a stock of bees in a hollow log. Avidly he studied the few books on beekeeping available at the time, and soon became the happy owner of an improved Huber hive, and several bar hives made according to Bevan, author of Bevan's *Treatise on the Honey Bee,* published in London in 1838. Constantly he experimented in trying to make a practical hive for the common beekeeper out of the Huber hive, but got no worthwhile results. He recalled that the only improvement he was thus far able to make was to give the hives greater protection against extremes of heat and cold.

As all beemen know, the first thing one beekeeper does in a new locality is hunt up people with the same passionate interest in this insect, and Langstroth was no exception. In the neighboring town of Colrain he found William W. Cary, who had some hives, and after meeting him a deep and lasting friendship sprang up between the two men. This friend was the first of the Carys to keep bees, but ever since members of the family have kept up their interest.

The Second Congregational Church of Greenfield is next door to what was known for years as the "Hollister House," a fine example of late colonial architecture in which Langstroth con-

ducted his High School for Young Ladies. In the church yard may be seen today a beautiful bronze plaque placed there in recognition of Langstroth's contribution to beekeeping. The old New England meeting house in which he preached has been replaced by a more modern, and doubtless more efficient, building; but to many it is far less beautiful than the original white-spired house of worship.

During Langstroth's pastorate at Greenfield, he suffered greatly from frequent attacks of his head trouble, which at last compelled him to resign his charge. Now he decided to return to the home of his boyhood and open a school for the education of young ladies there. He settled his family of three small children, one boy and two girls, in a house located at the corner of Chestnut and Schuylkill Seventh streets, as it was designated in the old system of naming streets in Philadelphia. Here in the fall of 1848 he opened his school. Today, we know the location as Sixteenth and Chestnut streets.

The house had a second-story porch, or piazza, and a number of attic rooms, and these Langstroth used for the apiary he soon established for experimentation. In the rear of the lot was the customary stable where he kept his driving horse and carriage. It is difficult to visualize this corner of Sixteenth and Chestnut as an area of homes and gardens with stables in the rear, and open countryside not far away where bees could forage, for Chestnut street has been for many years Philadelphia's chief commercial thoroughfare, thronged with shoppers. It ranks today as one of the most celebrated streets in America, and virtually all signs of family dwellings have given way to shops and business offices.

FIG. 9. Descendants of Lorenzo Lorraine Langstroth at the dedication of the Langstroth Bee Garden, October 20, 1951. From right to left: Miss Anna L. Cowan, granddaughter; Mr. A. H. Cowan, grandson; Mrs. Peggy Cowan Kohler, great-granddaughter; Mr. George Cowan, great-grandson, and Mrs. George Cowan; Wm. Langstroth Cowan, grandson.

At the time of establishing his Philadelphia apiary, Langstroth had studied every known type of hive, and was far ahead of beekeepers of his generation in appreciating the necessity for a taller hive than in common use, yet one which was compact in form to serve as living quarters for the bees except during the period of crop storage. He therefore placed one hive-body on top of another.

Through his intense study of the literature on beekeeping, he learned of the work of the Swiss scientist Huber, who had succeeeded in having bees build their comb in frames which were hinged so they might be separated like the leaves of a book. Moses Quinby, the other great beekeeper of Langstroth's time, used a hive of this same general type, but Langstroth found it of little more practical value than ordinary box hives. He next experimented with hives used by the English beekeeper Bevan, and certain French and German scientists. These had the combs built down from bars which rested on the top edge of an open box. This plan presented the difficulty that the bees built the combs so securely to the sides of the box that their removal was a soul-trying operation. Langstroth found further trouble when he put on a second story, for the bees then glued the upper body tightly to the bars of the lower hive. Unless the separation was made by very careful cutting, the combs would be wrecked, and only honey in perfect comb was salable to the public of that day.

This was where he stood in his investigations early in the spring of 1851 when he removed his apiary from his home some two miles. Working with the bar hives, Langstroth conceived the idea that if he lowered the tops of the bars a little, leaving a small space between them and the bottom of the upper box, that when it came time to cut the boxes apart, his knife would not encounter the wood of the bars and thus the task of separating the two hive-bodies would be easier. When he did this, he discovered that the bees did not fill any part of this space with their "glue" (propolis). This ⅜ inch passage is now known as a beespace, a corridor just high enough for the passage of a bee, and one that the bees leave open for access to other parts of the hive.

It seems strange that this discovery did not at once suggest to Langstroth the idea of giving the same space on all sides of the combs hanging from the bars by means of uprights fastened to them, thus changing the bars into movable frames; but it did not so occur to him and he used the convenient narrow space above the bars for a whole season without thinking of extend-

ing his idea further. In his reminiscences, Langstroth reports:

"Returning late in the afternoon from the apiary, which I had established some two miles from my city home, and pondering, as I had so often done before, how I could get rid of the disagreeable necessity of cutting the attachments of the combs from the walls of the hive, and rejecting, for obvious reasons, the plan of uprights, close-fitting (or nearly so) to these walls, the almost self-evident idea of using the same bee space as in the shallow chamber came into my mind, and in a moment the suspended movable frames, kept at a suitable distance from each other and the case containing them, came into being. Seeing by intuition, as it were, the end from the beginning, I could scarcely refrain from shouting out my "Eureka!" in the open streets. At that time there was visiting me my college classmate, the late Rev. E. D. Sanders, who afterward founded the Presbyterian Hospital in Philadelphia, and who had taken that season a lively interest in my apicultural experiments. Full of enthusiasm, we discussed, until a late hour, the results which both of us thought must come from using movable frames instead of bars. Before I sought my bed, under the date of October 30, 1851, I made this record in a private journal still in my possession: 'If the slats are made so that *a* and *b* (that is, the uprights), are about ⅜ inch from the sides of the hive, the whole comb may be taken out without being at all disturbed by cutting . . . By the very great ease with which the bars with their combs may be removed, a command over the whole proceedings of bees is obtained which is truly wonderful . . . The removal of the queen . . . and all other operations may be performed without injuring a single bee, thus preserving the apiary from constant irritation and keeping the bees always peaceable. It is obvious that the movable frames may be adapted to almost any hive, and that they will be of the greatest practical benefit.' " Langstroth may not have been properly trained in scientific methods, but he was wise enough to realize that it is imperative to record observations immediately and that those not promptly set down often become utterly worthless, because man's memory is unreliable.

One can imagine the excitement the next spring when, having moved his entire apiary to West Philadelphia to a site now part of the lovely campus of the University of Pennsylvania, he and Henry Bourquin, his apiary manager and a skilled cabinetmaker as well as a first-class beekeeper, entered upon the first trials of his invention. And their mounting exhilaration as they installed the first frame ends on the bars! The two were so absorbed in manipulating these new frames, removing them with no trouble from the hive-body and replacing them without injuring the bees, that they did not notice the presence of an old beekeeper friend who had come up and was watching them work. They did not even hear him as he spoke, until he fairly shouted, "Friend Lorenzo, you are so taken up with your new hive that you seem unable to hear me, or to see anything else. No doubt you think you have made a great invention; but I say you have made no invention. You have made *no invention* at all, but rather a *perfect revolution* in beekeeping!"

As soon as it was feasible, Langstroth applied for a patent on his invention, and it was granted in the fall of 1852. Whether he was hopeful of improving his financial condition by having his frame universally adopted, we do not know. One of the pathetic aspects of his work is shown by a letter written later by his wife begging the Commissioner of Patents to renew his patent since it had not been financially profitable to the inventor.

Because Langstroth now desired to give all his attention to his bees, he disposed of his school that spring (1852). But as had so frequently happened before, he had such a severe attack of his head trouble during the summer that he was completely prostrated. Since he could not even give instructions to his assistant, he was forced to abandon the business and sell his bees. Of this period of discouragement, he writes: "How often I can recall similar experiences, when in the heat of the race, and sometimes with the goal of success apparently almost gained, I have sunk down on the course, unable to take another forward step! I write these words with no disposition to murmur against any of God's providential dealings with me."

This ended Langstroth's life in Philadelphia, but his connection with the city was not severed. Since there was the usual pressure for money, Langstroth's wife accepted a position in the city as assistant teacher in a school for young women, which their two daughters could attend, while Langstroth went to live with the family of his brother-in-law, Almon Brainard, in Greenfield, Massachusetts. During the years in Philadelphia Langstroth had preached probably more than half his Sundays, and, when he returned to Greenfield, had sufficiently recovered his health so he soon was supplying the pulpit of the Congregational Church of Colrain nearby. He continued to do so until the fall of 1857. His wife and daughters spent their vacations with him in Colrain and his son worked on a nearby farm, and Langstroth reports each of their fam-

ily reunions as "a bright oasis in those long separations."

While living in Greenfield and Colrain, Langstroth tried with little success to sell his patented hive. But he wrote his famous book, "Langstroth on the Hive and the Honeybee." This was revised and re-issued many, many times from 1853 when it first appeared. This book was Langstroth's second great contribution to beekeeping, for, like his movable frame hive, it went 'round the world.

Between Langstroth's hive and his book, he became so widely known and respected that the two periodicals, "Gleanings in Bee Culture" and "American Bee Journal," both published his contributions simultaneously. This great respect that he engendered among beemen everywhere also made his third contribution to American beekeeping much easier than if he had not been famous. This third service to beekeeping in America was the importation of Italian bees, in which he shared. There had been sporadic attempts to import colonies, but these were at first not successful. Samuel Wagner, with whom Langstroth had been associated in other ventures, notably in an attempt to market his movable frame hive, had arranged for a shipment of Italians as early as 1855. It was made, but the bees perished on the way across the ocean. Four years later Wagner enlisted Langstroth's aid and, together with Richard Colvin of Baltimore, they ordered a colony from Italy's leading beekeeper, only to learn long afterward that the order was never received.

About this time the U. S. Department of Agriculture undertook the importation of Italian bees, and Langstroth's assistance was enlisted. He was the one who handled the single remaining Italian queen in Flushing when the first shipment arrived, and saved her. And he saved one or two others in another shipment that survived the trip a few days later.

Langstroth's later years were not happy. In 1870 his only son died; in 1872 his friend Samuel Wagner died; and in the following year his wife died. In 1874 he sold his apiary and never again had more than a few colonies at any time. His head trouble bothered him for long periods at a time, and finally his household, now consisting of himself and his daughter and her husband, Mr. H. C. Cowan, moved from Oxford, Ohio, where they had been living, to Dayton, Ohio, where Cowan's business required him to live.

On Sunday, October 6, 1895, Mr. Langstroth was to give the sermon at the Wayne Avenue United Presbyterian Church in Dayton. He was nearly 85 and his health, while it had been good of recent months, was really only fair. He mounted to the platform, where the minister had moved the pulpit to one side and provided a chair. He started his sermon with these words, "It is of the love of God that I wish to speak to you this morning—what it has been, what it is, what it means to us, and what we ought——." Lorenzo Lorraine Langstroth had completed his life.

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REMINISCENCES

WILLIAM LANGSTROTH COWAN

Grandson of Lorenzo Lorraine Langstroth

It is a little difficult to know what will interest beekeepers of today regarding the life of Grandfather Langstroth. I am not going to try to give a history of his life. That history has been written several times, and printed in the "American Bee Journal" and "Gleanings in Beeculture." Suffice it to say that he was born in 1810 and died in 1895, thus was 85 years old when he passed away.

A look at his portrait will, I am sure, tell you a great deal about his character. Kindliness, keen interest in life, and a sense of humor are evident, but I am sure you will understand when I tell you that the expressions most often used by people who see his picture for the first time are "What a kindly face"—"What a lovely old gentleman." And if a true gentleman is a "gentle man," then he was a true gentleman.

My very earliest recollection of my grandfather is revealing. In Dayton, Ohio, where he lived, the summers are extremely hot. Our drinking water came from a well—not a dug well, but a driven well, quite deep. Well can I remember Grandfather's saying, "Willie, how would you like to get me a drink? Pump it long enough so it will be cold. Get the water from the north-west corner of the well." When the pumping had been done, and the drink was

brought to him, the thanks were so appreciative that the small boy felt repaid.

One of the vivid memories that I share with my brothers and sisters is the recollection of his Grizzly Bear and Sly-Boots stories. As youngsters nothing gave us such delight as to get him to tell one of these. There was a wonderful man who was always sent for when a grizzly bear was disturbing the cattle or the country-side. Most ingenious were his methods of capturing and destroying the terrific marauder. And, often as he was called upon to tell us these yarns, never, to my recollection, did he repeat himself. There was always a new and thrilling procedure, which, at least to our childhood imaginations, was marvelously conceived and cleverly executed.

Then there was the wonderful fox who was continuously being hunted, and always eluding his pursuers. Sly-Boots was his name, and sly was his nature. Never the pack of hounds persistent enough to track him to his death.

I have often thought that if these stories could have been written in his beautiful, simple English style, they might easily have become as popular as Joel Chandler Harris' "Brer Rabbit" books. I know that they fascinated us as children, and not only us. One holiday afternoon, shortly before his death, the family were all away somewhere, except Grandfather. When we returned about six o'clock, here he was with a group of a dozen or more of the neighborhood youngsters, telling them one of his Grizzly Bear yarns. This was not an uncommon occurence.

One feature of these stories was the way they ended. Always was there some mention of honor, or thoughtfulness of others, or Christian conduct that, given with such sugar coating, was pleasant to take, and made a lasting impression on youthful minds. Nor was he lacking in stories interesting to older people. His memory was very retentive, and one story seemed to remind him of another. When in the mood, he would keep a group in gales of laughter.

As children one of our delights was to play with Grandfather's hair. It was very soft, and, being long, was easily parted, and it would part in any direction. He enjoyed having his head rubbed, and we enjoyed playing with it. He was very tolerant of our pranks, and we would part it straight across, or diagonally, and then laugh at him, and he at himself.

I have here a copy of the original patent of the Langstroth hive, of the application for that patent written by my grandmother or my mother (their handwriting was so much alike that I cannot tell them apart). Speaking of handwriting, Grandfather used to say that he had three—one anyone could read, one no one but he or his wife could read, and one he couldn't read himself when it was cold.

One of the marvels to me is where he found the time to do all the writing in longhand which he did. I have brought with me a number of letters, articles prepared for publication, etc. Those who are interested can see them at the exhibit in the Morris Mansion.

Here is a letter written to my Grandfather by his wife, my Grandmother. The time and patience required to read it, let alone the devotion to write it, speaks volumes of the industry of the older generations. Also, here is a letter from him to her. Truly our ancestors were workers. In going through his papers, the tremendous amount of time spent writing in longhand cannot fail to impress one. It is almost overpowering.

I have here also one of the books from my Grandfather's library. It is a treatise on Bees, by a Thomas Wildman, printed in 1765, and dedicated to "The Queen's Most Excellent Majesty."

I also have pictures of him at various ages, and a copy of a daguerreotype of his mother, showing a marked family resemblance.

One of my duties as a lad was to get from the public library the books which he read during

FIG. 10. William Langstroth Cowan unveiling the Lorenzo Lorraine Langstroth Memorial Bench at the dedication of the Langstroth Bee Garden, October 20, 1951.

those periods when his "head trouble," as he called it, prevented him from active work. History, biography, philosophy, and the better fiction were the books he read, and four, five, or six was a week's supply. Saturdays I used to start off with a basket of books to return, and a list of new ones to get. I have here a list of such books, found among his papers.

To you, Grandfather Langstroth is known as a beekeeper, an author, and as the inventor of the Langstroth hive. Possibly most of you know that he was very influential in the introduction into the Western World of Italian bees.

But his interests were much wider than that. He had a restless, inquiring mind, and everything interested him. His interest in Punic bees, in weather reports, in fertilizers, in horticulture, and the grafting of fruit trees, to mention only a few, was very great, and his knowledge very extensive. His Latin and Greek were of the old-fashioned, classical thoroughness, and he could read both languages fluently and understandingly. And it was as a tutor of mathematics at Yale that he earned enough to complete his theological education.

But, notwithstanding his intense concentration on matters pertaining to bee culture, never did he forget that he had been ordained a minister of the gospel. Belief and trust in God and in Jesus Christ as his personal Redeemer and Friend, was absolute, and an "ever present help in trouble."

My Father was a strict Scots Presbyterian, and his God was a strict, austere God of Justice. Grandfather Langstroth's God, on the other hand, was the God of Love. His God was a loving Father who "so loved the world that he gave his only begotten Son . . ."

On the day of his death, he was to preach the sermon at the Communion Service of our Presbyterian Church in Dayton, Ohio. An arm chair was placed near the edge of the rostrum, and he asked the indulgence of the congregation, as he felt unaccountably weary. With his kindly face, his crown of silvery hair, and his wonderful smile, he looked quietly over the gathering and said, in his usual firm but quiet manner, "I want to talk to you today of the Love of God, and of what we ought . . ." and he was gone. His last thoughts—Love and Duty.

PROGRAM OF THE DEDICATION EXERCISES, OCTOBER 20, 1951

Invocation — THE REVEREND BURLEIGH CRUIKSHANK
Minister, Presbyterian Church of Chestnut Hill

Welcome to Guests — EDWIN B. WILLIAMS
Provost, University of Pennsylvania, and Chairman of the Committee on Administration of the Morris Arboretum

Langstroth and the Academy of Natural Sciences
M. ALBERT LINTON
President, Academy of Natural Sciences of Philadelphia

The New Role of Honey Bees in Our National Economy — JAMES I. HAMBLETON
In Charge of Division of Bee Culture, United States Department of Agriculture

Introduction of Mr. E. F. Phillips, Jr., presenting the following paper completed by his father before his untimely death on August 21
EDWIN J. ANDERSON
Professor of Apiculture, Pennsylvania State College

Langstroth—Philadelphia Beekeeper — E. F. PHILLIPS
Late Professor Emeritus of Apiculture, Cornell University

Unveiling of the Lorenzo Lorraine Langstroth Memorial Bench — WILLIAM LANGSTROTH COWAN
Grandson of L. L. Langstroth

The program was followed by tea and inspection of the Exhibits at the Morris Mansion.